ing the upper wall so as not to disturb the relations of the base of the corolla and the filaments. Then with a small, sharp blade cut out from below the remaining upper wall of the ovary, taking care to clip off the style and leave it in place to fill the angular space which would otherwise be left. Having done this nothing is left to stop the lumen of the corolla tube but these filaments. If water be now dropped into the corolla it will be found to hold perfectly.

How any considerable quantity of rain which might fall into these upright flowers could get out again remains to be found out. But it is not unlikely that it will be found that when a certain quantity of water does collect, either by its weight it will bend the flower over and escape or by its presence may excite some auxotonic movement causing the flower to nod and dump it out.

A repetition of these experiments should of course be made upon newly opened flowers and upon the particular variety here described.

Botanizing in Texas.* II.

J. REVERCHON.

In this locality (House Mts.) two entirely new plants were discovered, and both have been decorated with the name of Reverchoni, a Diplachne and a Campanula. The latter is a little annual, making long ribbons of the finest blue in the cracks of the rocks, with here and there a large tuft of Cereus pectinatus all ablaze with its beautiful pink blossoms, or a picturesque cluster of Cereus paucispinus covered with brick-red flowers. The more noted plants collected here were: on the side of the mountain, Metastelma Palmeri, Zexmenia hispida, Cyclanthera dissecta, Ipomœa Lindheimeri; on the banks of a sandy creek, Astragalus leptocaulis, and a variety of Mentzelia Wrightii with very small flowers.

From House Mt. to Mason is a region mostly sandy or rocky, in which three rare plants were collected: Panicum ciliatissimum, Brazoria truncata, and Polypteris Hookeriana. Juglans rupestris began to appear along the rocky banks of streams.

At Mason, a little German town, we resumed our westward march. The soil is generally poor, sandy or gravelly, up the Llano valley, the plain being covered with mesquit brush. At a

*Continued from March, 1886, p. 59.

distance and on both sides of the valley is a continuous line of bold bluffs overlooking the plain. Excepting near the river, and an occasional grove of post-oak, the ligneous vegetation is scant and dwarf. The last sign of granitic formation was left in Mason county, and in reaching Kimball all the rocks are limestone. Here for the first time we met the Sophora speciosa, already in fruit, the red beans of which are considered very poisonous. In fact these beans, scattered over the rocks, seem to be respected by every kind of animal. Near our camp on the Little Saline creek we made a good collection: in the valley, Tetrodes Coulteri, Berlandiera lyrata, Parthenium lyratum, Gaura macrocarpa, Aristolochia brevipes, Coldenia canescens, and Croton Neo-Mexicanum; on the neighboring bluffs, Schœnocaulon Drummondii, Lepidium lasiocarpum, Abutilon parvulum, Styrax platanifolia, Perezia runcinata, Chrysactinia Mexicana, Hymenatherum tenuilobum, Atriplex canescens, and Leucæna setosa, the last being a remarkably fine shrub. There also occurred two Yuccas, Y. canaliculata, growing to the height of 9 or 10 feet and giving to the landscape a tropical appearance, the other, referred to Y. rupicola, though I think it is different.

Along the Big Saline creek we noticed for the first time since we left Dallas the Quercus Muhlenbergii; but afterwards we find this species quite abundant in the mountainous region of S. W. Texas.

The 16th of May we reached Junction City, where the two forks of the Llano river unite. We pitched our tent on the north fork, in a beautiful spot, and if we were not botanizing I would have much to say about the delicious fish, the squirrels, the beavers, etc. The river is full of Nuphar advena, and near a picturesque fall I collected Lythrum ovalifolium and Agrostis verticillata. In the thicket covered valley I notice the following species: Callirrhoe pedata, Antirrhinum maurandioides, Vesicaria Gordoni, Stillingia Torreyana; on the rocky bluffs, Specularia Lindheimeri, Allionia incarnata, Nicotiana trigonophylla, Notholæna sinuata, and a beautiful Cereus unknown to me. At the foot of a perpendicular rock near the river I found Euphorbia chamesula, and a grass new to science, Festuca Texana.

The north fork of the Llano is fringed with a growth of fine timber, but the high bluffs, which come closer to the river as we ascend the valley, are covered with bushes or stunted trees, Quercus Durandii making most of the thickets. Very often these bluffs are covered with high walls of hard limestone of dazzling whiteness.

On the 21st we arrived at old Fort Terrett, which is situated

at the headwaters of the North Llano. All the neigboring hills are densely covered with mountain cedars (Juniperus occidentalis, var. conjungens). A few plants were collected along the roads, such as Rivina lævis, Pentstemon Jamesii, and Nama Jamaicense, but nothing different from what we had found below.

West of Fort Terrett we found ourselves on a vast table land, the divide between Devil's river to the west and the Nueces to the south. This country is a perfect desert, with only temporary supplies of water in holes, plenty of grasses though not properly a prairie, being covered with mesquit bush, clumps of post-oak, and thickets of cedars and live oaks, the home of the peccary, or Mexican hog. The cretaceous rocks crop out in every direction, and traveling in a wagon through such a country is nothing but punishment. Here the curly mesquit grass (Hilaria cenchroides) abounds, and low and rich spots were perfect masses of the orange colored flowers of Coreopsis cardaminæfolia. We also observed for the first time Hoffmanseggia brachycarpa, Thelypodium linearifolium, Actinella odorata, one of the commonest plants on the plains of W. Texas, and Erodium cicutarium, but this last I am satisfied was introduced through the agency of transient sheep.

We were detained a whole week at Mackenzie Well, on the head of South Llano. The country is the same as the divide, but I had more leisure for collecting. The following are some of the most interesting plants: on the rocky knolls, Erythræa calycosa, Abutilon holosericeum, Encelia calva, Zexmenia hispida, and two ferns, Pellæa flexuosa and Notholæna sinuata; in lower places, Chamæsaracha coronopus, Aristolochia brevipes, Dalea rubescens, Abutilon Wrightii and parvula, Argythamnia Neo-Mexicana, and a new variety of Sporobolus asperifolius, called brevifolius by Dr. Vasey. On the banks of Mackenzie Lake was found Zapania cuneifolia, var. angustissima.

I collected there many other plants that occur in other western localities, such as Siphonoglossa pillosella, Aristida Reverchoni, Passiflora tenuiloba, and Boerhaavia viscosa.

At Mackenzie Well we were convinced of the futility of trying to reach the San Pedro, or Devil's river, or even the Nueces, by the divide, for the trails were nothing but piles of rocks, over which our wagon would not have lived three days. Reluctantly, therefore, we took a trail going back to Junction City by the South Llano. We found along this river about the same vegetation as before, but two remarkable plants of this region deserve mention. One is Nolina Texana, whose long leaves are used for thatching Mexican huts, the other the Sotol (Dasylirion Texanum), of which I will speak more hereafter.

At Junction City we took the Bandera road, going up Johnson's creek, where I had the pleasure of collecting for the first time the beautiful Macrosiphonia Berlandieri, and Galphimia angustifolia. A grass, Hilaria mutica, quite abundant on the plains of W. Texas, was found there, being the only locality where I observed it in all our trip. I must not fail to mention the aljorita bush (Berberis trifoliata), very abundant in these regions, and whose berries, either raw or cooked, are really good. The Mexicans and settlers use them extensively.

From the headwaters of Johnson's creek to the head of Guadalupe river, there is a mesa or table land of about 20 miles, where the vegetation is similar to that of the divide, and on which the only new plant found was the magnificent Ipomœa leptophylla. I noticed in a common Texan plant (Œnothera serrulata, var. spinulosa), whose flowers in the north and west are uniformly yellow, that here the stigmas were jet black, while a little further south the throat of the corolla also shared in this striking color.

The 3d of June we reached the Guadalupe, and the vegetation began to change. In the valley, Tetragonotheca Texana, Berlandiera Texana, Pentstemon Wrightii (mostly in seed); on the rocky bluffs, Eupatorium ageratifolium and Ptelea angustifolia (in fruit); on the banks of the river, Aspidium patens, and, in rocky shades, Asplenium parvulum.

The next day there appeared along the river the beautiful Sabine (Taxodium distichum). Afterwards we observed this tree along most of the rivers in the mountainous region north-west of San Antonio. Between Kerrville and Bandera the country is mountainous, covered with good grasses but not very interesting to the botanist, the only plants collected being Euphorbia angusta and Psoralea cyphocalyx. It is well to notice that the Psoralea bearing that name in Curtis's distribution is a new species, *P. Reverchoni* Watson.

The 6th we camped at Bandera's Pass, a very interesting place to the botanist. On both sides of the road are two high and very steep hills, up whose rocky sides I undertook to climb. My time and labor were not lost, for I found, first at the foot, a very coarse grass, Epicampes distichophylla; next in the rocks, Nolina Lindheimeriana; higher up, Prunus copallina, Fendlera rupicola, Rhus cotinoides (all in fruit); in the cedar breaks at the top, Onosmodium Bejariense (in seed), Streptanthus bracteatus, Verbesina Wrightii; and on exposed flat rocks, the graceful Erythrea calycosa, var. nana.

In nearing Bandera the live oaks grow to an enormous size,

and were covered with Tillandsia recurvata. We crossed the Medina at Bandera, where our only discovery was Amorpha lævigata, and took a westerly direction over what was called by the inhabitants a "good mountain road." Afterwards we understood the meaning of "mountain road." Soon we were in a very rough country, which we have good reason to believe no botanist ever visited. In fact, no one will ever visit it, who has any care for his limbs or neck. Of course in such a country progress was slow, and the 10th of April finds us camped on the banks of a fine stream, whose clear waters were dashing madly among the rocks. All around were hills clad with shrubbery and covered with overhanging rocks. We were in the wilderness and enjoyed it. It would be more than ungrateful not to pay a tribute to the great pile of dainty perch and fine trout lying before our camp fire. Beginning along the rivers, in swampy places are found several northern plants, such as Schoenus nigricans, Eleocharis rostellata, and Selaginella apus, mixed with Dichronema leucocephala and Reverchoni, Buchnera elongata, a variety of Samolus ebracteatus, and Epipactis gigantea; among the rocks, at the foot-hills, Asclepias perennis, Aspidocarpa hyssopifolia, Keerlia effusa, Cassia Lindheimeriana; on the top rocks, abundance of Laphamia Lindheimeri. A good many interesting shrubs are found here, Salvia ballotæflora, Budleia racemosa, Philadelphus serpyllifolia, Garrya Lindheimeri, Arbustus Xalapense, var. Texense, the last three in fruit. The last named species is called *Madrona* by the Indians, a small tree, very peculiar and picturesque in appearance. As for the ferns, near the water were Adiantum Capillus-Veneris, and Aspidium patens; amidst the rocky shades, Pellæa flexuosa, Cheilanthes Alabamensis, and Asplenium parvulum. But what made me forget all my falls and bruises was the discovery of the rare Aneima Mexicana, growing everywhere in the shade, and the rarest Pellæa aspera, found on exposed rocks!

At last we were out, emerging from the Sabinal cañon, and camped on that beautiful stream. Our principal finds are Capsicum baccatum, Salvia Rœmeriana, Acalypha hederacea, Russellia tuberosa, var. occidentalis (or, as I think, a good species), Bernardina myricæfolia, Cordia podocephola, Polygala ovalifolia, Indigofera Lindheimeriana, Euphorbia villifera and acuta, Melochia pyramidata, Triodia eragrostoidea, Muhlenbergia calamagrostoides, Setaria setosa, Chaptalia nutans, a new Petalostemon (P. luteolus Wats.), and a fern, Notholæna candida, the only one found on the rocky banks of the Sabinal. One plant deserves special mention, the beautiful Amoreuxia Wrightii. The pec-

caries are very fond of its roots. On the sandy plains below the cañon we find Dalea pogonathera, Cevallia sinuata, Menodora longiflora, Leucophyllum Texanum, Mimosa Berlandieri, and Lindheimeri; in the richest part of the prairie, Eupatorium Greggii and Desmanthus reticulatus.

Near the Sabinal cañon is the small cañon of Blanco, in which a curious cave has recently been discovered. Of course this new wonder had to be visited, and on our way we admired the gigantic *sotol* (Dasylirion Texanum) in all its glory. It is used in Mexico, as the Agave, to make an intoxicating liquor, and the bases of the leaves, that look like monstrous artichokes, are considered delicious vegetables, but we did not touch them. Here we added to our collection such plants as Heteropogon contortus, Fallugia paradoxa, Jatropha spathulata, and Mirabilis Jalapa.

Thus far we had had a tolerably pleasant time, in spite of gnats, mosquitoes, and other insects, but the dry weather had now set in, the heat was increasing alarmingly, the water was sinking very fast into the sandy beds of the rivers, and, what was more important to me, the vegetation was beginning to shrivel up and disappear. Our team was jaded, our provisions consumed, our clothes in tatters, our finances exhausted. We had either to refit our expedition or retreat, hence after consultation, the march on Mexico was postponed and a retreat ordered.

Uvalde was the most south-western point visited by our expedition, where we found Malvastrum tricuspidatum. Along the Frio, nearly dry all the way, were found Aristolochia longifolia and Oxalis dichondræfolia, and two fine shrubs, Anisacanthus Wrightii and Chilopsis saligna.

The homeward journey began the 20th of June. Between Uvalde and Castroville is an extensive plain, covered with thickets of mesquit, Acacia Rœmeriana, A. Wrightii, but the most common is certainly A. Berlandieri. There was also Condalia obovata, Celtis nitida, Scheifferia cuneifolia, Diospyros Texana. Among the herbaceous plants were Dianthera parvifolia, Perezia Wrightii, Sanvitalia ocymoides, Helianthus ciliaris, and Jatropha Berlandieri. On the banks of the Seco we gathered Marsilia macropoda, Neptunia pubescens, and Synedrella vialis. We noticed also, climbing on the mesquit, the singular Ephedra pedunculata, but with neither flower nor fruit.

For the most part the vegetation along the return route was similar to that we had met earlier in coming out, and towards the last of July we reached home.